WS8351A/WS8352A/WS8354A-DST

350MHz Single, Dual & Four Channel Arbitrary Function Generators

Tabor's WS835x is a 350MHz single, dual & four channel generator with the functionality of a function, arbitrary, modulation and pulse/pattern generator, all in one easy to use, high performance, compact stand alone bench top, which enables engineers to test analog, digital and mixed signals devices with a single instrument.

500MHz sine waves and 350MHz square waves

Triangle, ramp, sinc, gaussian, exponential, noise, pulse generation with variable edge DC and Arbitrary waveforms

Powerful sequence generator links and loops segments

2GS/s, 14-Bit, 16Mpts arbitrary waveforms

AM, FM, FSK, Sweep and PSK modulation

Store/recall on memory stick or 1GB internal memory

Up to 4Vp-p into 50Ω, 8Vp-p into open circuit

Ethernet, USB and GPIB interfaces & 4" color LCD

AM, FM, FSK, PM & Sweep

Standard Waveforms

The WS835xA-DST has 11 built-in functions for quick and easy waveform generation. Front panel operations allows for easy selection and editing of all waveform parameters. All the standard waveforms can reach up to 125MHz with Sine and Square going as high as 350MHz.

User Defined Waveforms

For more advanced users the WS835xA-DST with its 14-bit vertical resolution offers a standard 16Mpts memory depth and a 2GS/s sample clock for designing waveforms, with the ability to control and edit the value of each and every point any wave is possible.

Modulation Waveforms

In addition to the capability of generating any shape and style of waveform with the arbitrary waveform generation power, the series can also do standard modulation schemes such as FM, AM, FSK, sweep and PSK, without sacrificing the power of the instrument control and output run modes.

Pulse / Pattern Creation

Generating complex pulse trains has never been easier. The Pulse Composer is a powerful built-in tool that converts the WS835xA-DST to a very sophisticated Pulse/Pattern Generator, allowing to create literally any complex pulse train / pattern, whether it's a single pulse, multi-level, linear-points, initialization or preamble pattern definition, arbitrary bit design, user-defined or even standard random patterns with programmable resolution, so it doesn't matter if your application is radar communications, nanotechnology or serial bus testing, the pulse/pattern composer is the right tool for your application. Moreover, all the WS835xA-DST advanced trigger modes are applicable, hence one can choose to use the "step" mode to advance every bit independently or the "once" mode to advance a complete data block in one trigger event, enabling even more applications, such as trigger, clock and data protocols.

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Specifications

CONFIGURATION

Output Channels:	1, 2 or 4, semi-independent

STANDARD WAVEFORMS

Frequency Range:	
Sine:	1µHz to 500MHz
Square, Pulse:	1µHz to 350MHz
All Others:	1µHz to 125MHz
SINE	
Start Phase:	0-360°
Phase Resolution:	0.01°
Harmonics Distortion @1Vp-p (Typ.):	
5MHz to 200MHz:	<-40dBc
200MHz to 350MHz:	<-50dBc
Non-Harmonics Distortion @1Vp-p (Typ.):	
1MHz to 100MHz:	<-80dBc
100MHz to 250MHz:	<-75dBc
250MHz to 350MHz:	<-70dBc
THD:	0.1% (DC to 100kHz)
Flatness:	±0.5dB cross range
SSB Phase Noise (10kHz offset) typ.:	
1MHz Carrier:	<-120dBc/Hz
10MHz Carrier:	<-118dBc/Hz
100MHz Carrier:	<-115dBc/Hz
250MHz Carrier:	<-110dBc/Hz
350MHz Carrier:	<-100dBc/Hz
TRIANGLE / RAMP (SAW-TOOTH)	
Start Phase:	0-360°
Phase Resolution:	0.01°
Timing Ranges:	1.0%-99.9% of period
SQUARE	
Duty Cycle Range:	1.0% to 99.9%
Resolution:	0.1%
Rise/Fall Time:	<1ns
Overshoot (typ.):	<5% (typ)
Jitter (rms):	<10ps
GAUSSIAN	
Time Constant:	10-200
EXPONENTIAL PULSE	
Type:	Rise or Decay, selectable
Time Constant:	-100 to 100
REPETITIVE NOISE	
Bandwidth:	125MHz
DC	
Range:	
WS8101/2:	-8V to 8V
WS8104:	-5V to 5V

PULSE

Pulse Mode:	Single or double, programmable
Polarity:	Normal, inverted or complement
Period:	4ns to 1.6s
Parameters Ratio:	16,000,000 to 1
Resolution:	1ns
Pulse Width:	2ns to 1.6s
Resolution:	5ns
Accuracy:	<2% (typ.)
Rise/Fall Time:	
Fast:	<1ns
Linear:	1ns to 1.6s
Double Pulse Delay:	4ns to 1000s
Impedance:	50Ω
Amplitude Window:	100mVp-p to 4Vp-p (1)
Low Level:	-2V to +1.95V (1)
High Level:	-1.95V to +2V (1)

(1) Double into option impedance

PULSE / PATTERN COMPOSER

Number of Levels:	1 to 1000
Dwell Time:	500ps to 10s
Transition type:	Fast or Linear
Memory:	100k
Amp. Resolution:	4 points
Time Resolution:	1 to 1k
Waveform Granularity:	500ps to 100ns (auto or user)
PATTERN	
Pattern Source:	PRBS or user-defined
PRBS Type:	PRBS7, PRBS9, PRBS11, PRBS15, PRBS23, PRBS31, USER
Data Rate:	10Bit/s to 350MBit/s
Number of Levels:	2, 3, 4, 5
High/Low Levels:	±2.5V
Resolution:	4 digits
Loops:	1 to 1e6
Preamble:	1 to 512e3
Length:	1 to 512e3

ARBITRARY WAVEFORMS

Sample Rate:	10MS/s to 2GS/s
Vertical Resolution:	14 bits
Waveform Memory:	16Mpts
Min. Segment Size:	192 points
Resolution:	16 points
No. of Segments:	1 to 1k
Waveform Granularity:	1 point

SEQUENCED WAVEFORMS

Sequencer Steps:	1 to 1k
Segment Loops:	1 to 1M
Advanced Modes:	Continuous, once (x"N"), stepped
Advance Source:	External, internal or software

MODULATION

Carrier Waveform:	Sine wave
Carrier Frequency:	1µHz to 350MHz
Source:	Internal
FM	
Modulating Shape:	Sine, square, triangle, ramp
Modulating Freq.:	100Hz to 35MHz
Deviation Range:	10mHz to 175MHz
FSK / FREQUENCY HOPPING	
FSK Baud Rate:	10mbps to 350Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	2ns to 10s
Resolution:	2ns
SWEEP	
Sweep Step:	Linear or log
Sweep Direction:	Up or Down
Sweep Time:	1µs to 10ms
CHIRP	
Modulation Shape:	Pulse
Pulse Repetition:	
Range:	200ns to 20s
Resolution:	3 digits
Accuracy:	100ppm
AM	
Envelope Waveform:	Sine, square, triangle, ramp
Envelope Freq.:	100Hz to 1MHz
Modulation Depth:	0.1% to 200%
ASK / AMPLITUDE HOPPING	
ASK Baud Rate:	10mbps to 350Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	2ns to 10s
Resolution:	2ns

COMMON CHARACTERISTICS

FREQUENCY	
Resolution:	8 digits
Accuracy/Stability:	Same as reference

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ACCURACY REFERENCE CLOCK	
Internal:	1ppm/year aging rate
External (10MHz):	-5dBm to 5dBm, 50Ω
AMPLITUDE	
Range:	
Single-ended:	50mV to 4Vp-p into 50Ω (1)
Differential:	100mV to 8Vp-p into 50Ω (1)
Resolution:	4 digits
Accuracy (1kHz):	±(3% +5mV)
Rise/Fall Time:	<1ns, typ.
Overshoot:	5%, typ.
OFFSET	
Range:	-1.5V to + 1.5V into 50Ω
Resolution:	4 digits
Accuracy:	±(5% +5mV)

OUTPUTS

MAIN OUTPUTS	
Connectors:	Front panel SMA
Type:	Single-ended or differential
Impedance:	50Ω ±1%
Protection:	Short Circuit to Ground, 10s max
SYNC OUTPUT	
Connector:	Front panel SMA
Source:	Channel 1 or channel 2
Type:	Single ended
Waveform Type:	
Pulse:	16 points width
WCOM:	Waveform complete
Impedance:	50Ω
Amplitude:	1V; doubles into high Z
Variable Position Control:	
Range:	0 to segment length
Resolution:	16 points
Rise/Fall Time:	2ns, typ.
Variable Width Control:	
Range:	16 points to segment length
Resolution:	16 points
MARKER OUTPUTS	
Number of Markers:	4, Differentials
Connectors:	Rear panel SMB
Amplitude Voltage:	
Window:	0V to 1.25V, single-ended; 0V to 2.5V, differential
Low Level:	0V to 0.8V, single-ended; 0V to 1.6V, differential
Low Level:	0.5 V to 1.25V, single-ended; 0V to 2.5V, differential
Resolution:	10mV
Accuracy:	10% of setting
Width Control:	2 SCLK to segment length
Position Control:	
Range:	0 to segment length
Resolution:	2 points
Resolution:	4 digits
Initial Delay:	4ns±½ clock (Output to marker)
Variable Delay:	
Control:	0 to segment length
Range:	2 points
Resolution:	0 to segment length
Accuracy:	2 points
Skew Between Mrk:	10ps, typ.
Rise/Fall Time:	<1ns, typ.

INPUTS

TRIGGER & EVENT INPUTS	
Connector:	
Tirgger In:	Front panel SMA
Event In:	Rear panel BNC
Frequency Range:	0 to 15MHz
Input Impedance:	10kΩ
Polarity:	Positive or negative, selectable
Damage Level:	±20V
Sensitivity:	100mV
Trigger Level Control:	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
Min. Pulse Width:	10ns
EXTERNAL REFERENCE INPUT	
Connector:	Rear panel SMB
Input Frequency:	10MHz / 100MHz
Impedance:	50Ω
Voltage Swing:	-5dBm to 5dBm
Damage Level:	10dBm
EXTERNAL SAMPLE CLOCK INPUT	
Connector:	Rear panel SMA
Voltage Swing:	0dBm to 10dBm
Input Impedance:	50Ω
Input Frequency:	1GHz to 4GHz (Double the internal clock)
Clock Divider:	1/1, 1/2, 1/4, 1/256, separate for each channel
Damage Level:	15dBm

RUN MODES

Type:	Continuous, self armed, armed, triggered, normal, override, gated, burst
Continuous:	A selected output function shape is output continuously.
Self Armed:	No start commands are required to generate waveforms.
Armed:	The output dwells on a DC level and waits for an enable command and then the output waveform is output continuously; An abort command turns off the waveform.
Triggered:	A trigger signal activates a single-shot or counted burst of output waveforms and then the instrument waits for the next trigger signal.
Normal Mode:	The first trigger signal activates the output; consecutive triggers are ignored for the duration of the output waveform.
Override Mode:	The first trigger signal activates the output; consecutive triggers restart the output waveform regardless if the current waveform has been completed or not.
Gated:	A waveform is output when a gate signal is asserted. The waveform is repeated until the gate signal is de-asserted. Last period is always completed.
Burst:	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.

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TRIGGER CHARACTERISTICS

EXTERNAL	
Source:	Channel 1, channel 2, or both
Slope:	Positive/Negative, selectable
Damage Level:	±20V
Input Frequency:	DC to 15MHz
Trigger Level Control:	
Range:	-5V to 5V
Resolution:	12 bit (2.5mV)
Accuracy:	±(5% of setting + 2.5mV)
Sensitivity:	0.2Vp-p
Min. Pulse Width:	10ns, min.
System Delay:	200 SCLK periods + 50ns
Trigger Jitter:	Separate for each channel
Range:	0 to 8M SCLK periods
Resolution:	4 points
Accuracy:	Same as SCLK accuracy
Smart Trigger:	Detects a unique pulse width
Conditioned Trigger:	< pulse width, > pulse width or <>pulse width
PW Range:	50ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)
Trigger Jitter:	Ignores triggers for a hold-off
Hold-off Range:	100ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)
Trigger Jitter:	2ns at max. SCLK (4 SCLK)
INTERNAL / TIMER	
Range:	200ns to 20s
Resolution:	20ns
Error:	3 SCLK + 20ns
MANUAL	
Source:	Soft trigger command from the front panel or remote

INTER-CHANNEL SKEW CONTROL

Initial skew:	200ps
COURSE TUNING	
Control:	
Range	0 to waveform-length points
Resolution	4 points
Accuracy:	Same as SCLK accuracy
FINE TUNING	
Control:	
Range	-3ns to +3ns
Resolution	10ps
Accuracy:	(10% of setting + 20ps)

GENERAL

Voltage:	100 to 240VAC, 50-60Hz
Power Consumption:	150W max.
Display Type:	TFT, Color LCD
Size:	4”
Resolution:	320 x 240 pixels
Interfaces:	
USB 2.0:	
Host:	1 x Front, USB type A
Device:	1 x Rear, USB type B
LAN:	1 x Rear, 1000/100 BASE-T
GPIB:	1 x Rear, IEEE-488.2
Dimensions (WxHxD)**:**	
With Feet:	315 x 102 x 395 mm
Without Feet:	315 x 88 x 395 mm
Weight:	
Without Package:	4.5 Kg
Shipping Weight:	6 Kg
Temperature:	
Operating:	0°C to +40°C
Storage:	-40°C to +70°C
Warm up time:	30 minutes
Humidity:	85% , non-condensing
Safety:	CE Marked, IEC61010-1-1:2008
EMC:	IEC 61326-1:2006
Calibration:	2 years
Warranty:	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
WS8351A-DST	350MHz Single Channel Arbitrary Function Generator
WS8352A-DST	350MHz Dual Channel Arbitrary Function Generator
WS8354A-DST	350MHz Four Channel Arbitrary Function Generator
ACCESSORIES	
S-Rack Mount:	19" Single Rack Mount Kit
Case Kit:	Professional Carrying Bag